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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/696,888
Filing Date: October 30, 2003
Appellant(s): TRETTER ET AL.

Jeff A. Holmen (Reg. No. 38,492)
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 8/01/2007 appealing from the Office action mailed 4/05/2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

US 2003/0020809	GIBBON	1-2003
US 6,466,618 B1	MESSING ET AL.	10-2002

US 6,990,249 B2	NOMURA	1-2006
JP 54-136135	TANAKA ET AL.	10-1979

Park, S. - "Super-Resolution Image Reconstruction: A Technical Overview" IEEE Signal Processing Magazine, vol20 (May 2003), pp. 21-36.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims and appear in the Final Rejection dated 4/05/2007 (repeated below for convenience):

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-5 and 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gibbon et al (US 2003/0020809 A1) in view of Messing et al (US 6,466,618 B1).

Re Claim 1: Gibbon discloses a method of displaying an image with a display device (see paragraph [0001], [0031], lines 1-7), the method comprising of receiving image data on a first type of grid (see paragraphs [0012], [0007], lines 9-10, "high resolution of the source material"); generating a first sub-frame (see Fig. 5, Ref. No. 33, paragraphs [0034], lines) and a second sub-frame (see Fig. 5, Ref. No. 34, paragraphs [0034]) corresponding to the image data, the first and the second sub-frames each generated on a second type of grid that is different than the first type of grid (low resolution or in other words smaller grid size is considered to be a different grid, paragraph [0014], lines

3-4), wherein one of the first type of grid and the second type of grid is a non-rectangular grid; and alternating between displaying the first sub-frame in a first position and displaying the second sub-frame in a second position spatially offset from the first position (see Fig. 7, paragraph [0036], [0014], [0035]).

However, Gibbon fails to disclose one of the first type of grid and the second type of grid is a non-rectangular grid.

Messing discloses one of the first type of grid / rectangular grid and the second type of grid / irregular grid or quincunx grid or a diamond grid is a non-rectangular grid (see Fig. 6, the first type rectangular grid is on the high resolution image 72 and the second type diamond grid is on the low resolution image 78, col. 5, lines 1-3, col. 6, lines 8-34, col. 7, lines 49-50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Gibbon's method using Messing's teachings by including Messing's first type rectangular grid and second type diamond grid to Gibbon's receiving image and Gibbon's sub-frames in order to be able to construct a high-resolution image from low-resolution images which incorporate different geometric grids (see Messing, col. 5, lines 1-3, col. 6, line 29).

As to claim 10, the claim is the corresponding systems claim to claim 1 respectively. The discussion is addressed with regard to claim 1.

Re Claims 2 and 11 respectively: Messing further discloses first type of grid is a rectangular grid (see Fig. 6, the image 72 is on a regular rectangular grid, col. 6, lines 8-34) and the second type of grid is a diamond grid (see Fig. 6, the image 78 is on a irregular grid or in other words on a quincunx grid or in other words on a diamond grid, col. 6, lines 8-34).

Re Claims 3 and 12 respectively: Messing further discloses that the image data includes rectangular-shaped pixels on the rectangular grid (see Fig. 6, the image 72 is on a regular rectangular grid, col. 6, lines 8-34) and the first and second sub-frames (Gibbon discloses the first and second sub-frames) each include diamond-shaped pixels on the diamond grid (see Fig. 6, the image 78 is on a irregular grid or in other words on a quincunx grid or in other words on a diamond grid, col. 6, lines 8-34).

Re Claims 4 and 13 respectively: Messing further discloses that the first type of grid is a diamond grid (see Fig. 7, Ref. No. 78, see col. 6, lines 23-35, green irregular grid or in other words the quincunx grid or in other words the diamond grid) and the second type of grid is a rectangular grid (see Fig. 7, Ref. No. 106, see col. 6, lines 23-35).

Re Claims 5 and 14 respectively: Messing further discloses that the image data includes diamond-shaped pixels on the diamond grid (see Fig. 7, Ref. No. 78, see col. 6, lines 23-35, green irregular grid or in other words the quincunx grid or in other words the diamond grid) and the first and the second sub-frames (Gibbon discloses the first and

second sub-frames) each include rectangular-shaped pixels on the rectangular grid (see Fig. 7, Ref. No. 106, see col. 6, lines 23-35).

3. Claims 6-7 and 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gibbon as modified by Messing as applied to claims 1 and 10 above, and further in view of Park ("Super-Resolution Image Reconstruction: A Technical Overview"; IEEE Signal Processing Magazine vol 20, pages 21-36, May 2003). The teachings of Gibbon as modified by Messing have been discussed above.

However, as recited in claims 6 and 15, Gibbon as modified by Messing does not disclose or fairly suggest how the relationship between sub-frame values and high resolution image values correspond, the relationship being based on minimization of an error metric between the high resolution image values and a simulated high resolution image.

Park discloses how the relationship between sub-frame values and high resolution image values correspond, the relationship being based on minimization of an error metric between the high resolution image values and a simulated high resolution image (see page 30, paragraph 2, "Reconstruction results by POCS ...", a simulated high resolution image is considered because the reconstruction results are after several iterations).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Gibbon's system as modified by Messing, using Park's teaching by including the step of applying the POCS algorithm in order to

solve the restoration problem to estimate the high resolution image (simulated high resolution image) (see Park, page 29, Section – Projection onto Convex Sets Approach, paragraph 1).

However, as recited in claims 7 and 16, Gibbon as modified by Messing does not disclose or fairly suggest how the simulated image is based on a convolution of the first and the second sub-frames with an interpolating filter.

Park discloses the simulated image is based on a convolution of the first and the second sub-frames with an interpolating filter (see page 25, Section: Nonuniform Interpolation Approach, a simulated image is considered because the reconstruction results are after several iterations).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Gibbon's system as modified by Messing, using Park's teachings by including the step of applying the interpolation algorithm in order to go from a low resolution grid onto a high resolution grid (see Park, Fig. 6, page 25, Section - Nonuniform Interpolation Approach, paragraph 1) as well as estimate the high resolution image (simulated high resolution image).

4. Claims 19-24, 27-34, and 37-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view Messing and further in view of Park ("Super-

Resolution Image Reconstruction: A Technical Overview"; IEEE Signal Processing Magazine vol 20, pages 21-36, May 2003).

Re Claim 19: Gibbon discloses a system for generating low resolution sub-frames for display at spatially offset positions to generate the appearance of a high resolution image (see paragraphs [0012], lines 12-14, [0014], lines 4-7), the system comprising the means for receiving a first high resolution image on a first type of grid (see paragraphs [0012], [0007], lines 9-10, "high resolution of the source material"); means for storing a relationship between low-resolution sub-frame values and high resolution image values, the relationship based on minimization of an error metric between the high resolution image values and a simulated high resolution image that is a function of the low-resolution sub-frame values; and means for generating a first plurality of low resolution sub-frames for display at spatially offset positions to generate the appearance of a high resolution image (see paragraphs [0012], lines 12-14, [0014], lines 4-7) based on the first high resolution image and the stored relationship, each of the low resolution sub-frames generated on a second type of grid (see Fig. 5, Ref. No. 33-34, paragraph [0034], [0014], lines 3-4, low resolution or in other words smaller grid size is considered to be a different grid, paragraph), wherein one of the first type of grid and the second type of grid is a non-rectangular grid.

However, Gibbon fails to disclose one of the first type of grid and the second type of grid is a non-rectangular grid and exactly how the relationship between sub-frame values and high resolution image values correspond, the relationship being based on

minimization of an error metric between the high resolution image values and a simulated high resolution image.

Messing discloses one of the first type of grid / rectangular grid and the second type of grid / irregular grid or quincunx grid or a diamond grid is a non-rectangular grid (see Fig. 6, the first type rectangular grid is on the high resolution image 72 and the second type diamond grid is on the low resolution image 78, col. 5, lines 1-3, col. 6, lines 8-34, col. 7, lines 49-50).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Gibbon's method using Messing's teachings by including Messing's first type rectangular grid and second type diamond grid to Gibbon's receiving image and Gibbon's sub-frames in order to be able to construct a high-resolution image from low-resolution images which incorporate different geometric grids (see Messing, col. 5, lines 1-3, col. 6, line 29).

However, Gibbon as modified by Messing does not disclose or fairly suggest respectively exactly how the relationship between sub-frame values and high resolution image values correspond, the relationship being based on minimization of an error metric between the high resolution image values and a simulated high resolution image.

Park discloses how the relationship between sub-frame values and high resolution image values correspond, the relationship being based on minimization of an error metric between the high resolution image values and a simulated high resolution image (see page 30, paragraph 2, "Reconstruction results by POCS ...", a simulated

high resolution image is considered because the reconstruction results are after several iterations).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Gibbon's system as modified by Messing, using Park's teaching by including the step of applying the POCS algorithm in order to solve the restoration problem to estimate the high resolution image (simulated high resolution image) (see Park, page 29, Section – Projection onto Convex Sets Approach, paragraph 1).

As to claim 27, the claim is the corresponding computer-readable medium claim to claim 19 respectively. The discussion is addressed with regard to claim 19.

As to claim 31, the claim is the corresponding method claim to claim 19 respectively. The discussion is addressed with regard to claim 19.

As to claim 37, the claim is the corresponding system claim to claim 19 respectively. The discussion is addressed with regard to claim 19.

As to claims 20-24, the claims are the corresponding system claims to claims 2-5 and 7 respectively. The discussion is addressed with regard to claims 2-5 and 7.

As to claims 28-30, the claims are the corresponding computer-readable medium claims to claims 2, 4, and 7 respectively. The discussion is addressed with regard to claims 2, 4, and 7.

As to claims 32-34, the claims are the corresponding method claims to claims 2, 3, and 7 respectively. The discussion is addressed with regard to claims 2, 3, and 7.

As to claims 38-40, the claims are the corresponding system claims to claims 2, 3, and 7 respectively. The discussion is addressed with regard to claims 2, 3, and 7.

5. Claims 8-9, 17-18, 25-26, 35-36, and 41-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gibbon as modified by Messing and Park as applied to the claims above, and further in view of Nomura et al (US 6,990,249 B2) and Tanaka et al (JP 54136135 A). The teachings of Gibbon as modified by Messing and Park have been discussed above.

However, as recited in claims 8-9, 17-18, 25-26, 35-36, and 41-42, Gibbon as modified by Messing and Park does not disclose or fairly suggest specifically that the interpolation filter includes five filter coefficients, four coefficients of which are one-eighth and one coefficient which is one-half, or four coefficients of which are one-half and one coefficient which is one.

Nomura discloses that the interpolation filter includes five filter coefficients (see Fig. 18a, general spatial filter divided by a constant Const), four coefficients of which are one-eighth and one coefficient which is one-half (see Fig. 18a, consider $^{\beta=1/8,\alpha=1/2,\gamma=0}$), or four coefficients of which are one-half and one coefficient which is one (see Fig. 18a, consider $^{\beta=1/2,\alpha=1,\gamma=0}$). Tanaka specifically discloses the interpolation filter with five filter

coefficients, four coefficients of which are one-eighth and one coefficient which is one-half (see Fig. 3).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to further modify Gibbon's system as modified by Messing and Park, using Nomura's and Tanaka's teachings by including the specific five coefficient interpolation filter in order to interpolate one image to another without introducing much noise which could deteriorate the detailed information.

(10) Response to Argument

I. Rejection of Claims 1-5 and 10-14 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing

A. Rejection of Claim 1 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing.

1. *The Appellant firstly argues*, regarding claim 1 (see Appeal Brief, pp. 8-10), that Gibbon does not teach or suggest "receiving image data for an image on a first type of grid, and generating sub-frames corresponding to the image data on a second type of grid that is different than the first type of grid, wherein one of the first type of grid and the second type of grid is a non-rectangular grid" because the Appellant believes that Gibbons teachings of different resolution grids doesn't constitute the claimed language of "a different grid".

The Appellant secondly argues that Messing does not teach or suggest "receiving image data for an image on a first type of grid, and generating sub-frames corresponding to the image data on a second type of grid that is different

than the first type of grid, wherein one of the first type of grid and the second type of grid is a non-rectangular grid" because the Appellant believes that Messing's teaching of color planes which are arranged on a partially non-coincident manner (sampling the green color grid on a quincunx grid) does not constitute the claimed language.

The Appellant thirdly argues similarly that Messing's teachings of the multi-frame resampler 150 which resamples multiple low-resolution sampled frames 110 to generate a high resolution frame 154 does not constitute the claimed language.

2. The Examiner's response to the Appellants' first argument is that Gibbon does teach the essential framework of the entire claimed limitation except for the minor change "wherein one of the first type of grid and the second type of grid is on a non-rectangular grid". Gibbon teaches creating two low resolution sub-images from a received high resolution image and alternatively displaying the two low resolution sub-images by an offset to the human visual system to allow the human visual system to combine these two offset low-resolution sub-images and perceive a high resolution image (see Gibbon, paragraph [0014] and [0034]-[0035], Figs. 4-6) which essentially is the applicants invention. The Examiner believes that the different image resolutions between the high resolution image (first type) and the low resolution images (second type) do show the claimed limitation of "a different grid" because having different images on different resolutions means that the grid size is different giving rise to the interpretation of "a

different grid". However, as explained before, Gibbon does not disclose "wherein one of the first type of grid and the second type of grid is on a non-rectangular grid" because Gibbon teaches that the two different types of grids (the high and low resolution grids) are both rectangular grids as seen in Figs. 4-6 of Gibbon. Therefore the Messing reference was used as a secondary reference to ***only*** show this limitation wherein "one of the first type of grid and the second type of grid is on a non-rectangular grid" which Gibbon does not disclose.

As for the Appellants second and third argument that Messing does not teach the entire claim, the Examiner would like to once again point out that Messing is used as a secondary reference to ***only*** show this limitation wherein "one of the first type of grid and the second type of grid is on a non-rectangular grid" while Gibbon teaches the essential claimed invention. Messing is clearly in the image-processing field, and more specifically in the field of image resolution improvement just as Gibbon is as well. Messing teaches a high resolution image 72 (see Messing, Fig. 6, 72 is on a rectangular grid) is sampled to generate low resolution sub-lattice images 78 (see Messing, Fig. 6, 78 is on a irregular grid or in other words a non-rectangular grid or in other words a quincunx grid or in other words a diamond grid) on different grids (see Messing, col. 7, lines 49-50, Messing shows that the grids may be on any regular/rectangular or irregular/non-rectangular grids). Therefore Messing does teach that the high resolution image and the low resolution image are on different grids "wherein one of the first type of grid and the second type of grid is on a non-rectangular grid". It is in this

reasoning that the Examiner has used the Gibbon and Messing references wherein the Gibbon reference teaches the essential core of the claimed invention while Messing obviously teaches the minor detail that the one type of grid is on a rectangular grid while the other is on a non-rectangular grid (Messing is teaching the minor detail that images may be on different grid patterns [rectangular and non-rectangular] which is definitely well known to one of ordinary skill in the art at the time of the invention). Incorporating Messing into Gibbon is a predictable variation of the well-known technique to derive the instant invention. The obviousness rationale advanced hereinabove is consistent with the criteria articulated in *KSR International Co. v. Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007).

3. *The Appellant argues* (see Appeal Brief, pp. 7, Section II, "First, the Examiner must show ...") that there is no suggestion to combine the teachings of the multiple references.

4. The Examiner's response to the Appellants' argument that there is no suggestion to combine the references is that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, Messing teaches the receiving image is a high-resolution image and

produces low resolution sub-lattice images on different geometric grids and with these low-resolution sub-lattice images on different geometric grids constructs a high resolution image which is done through superimposition (see Messing, col. 5, lines 1-3, the final high resolution image is "constructed" using the low resolution images). Therefore there is suggestion to combine Gibbon and Messing because both deal with the same relative art in that they both are creating a high-resolution image using low-resolution images (Messing creates this high resolution image through superimposition with computers while Gibbon creates this high resolution image through superimposition with human visual system as discussed above).

5. *The Appellant argues* (see Appeal Brief, pp. 7, Section II, "Second, the prior art can be modified or combined ...") that there is no expectation of success for the combined teachings of the multiple references.

6. The Examiner's response to the Appellants' argument that there is no expectation of success is that the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

7. *The Appellant argues* (see Appeal Brief, pp. 7, Section II, "In performing the obviousness inquiry under 35 U.S.C. 103, the Examiner must avoid hindsight") that the examiner's conclusion of obviousness is based upon improper hindsight reasoning.

8. The Examiner's response to the Appellants' argument that the Examiner used improper hindsight reasoning is that it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

For these reasons, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 1.

B. Rejection of Claim 2 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing.

1. *The Appellant firstly argues,* regarding claim 2 (see Appeal Brief, pp. 10-11) that Gibbon does not teach or suggest "receiving image data for an image on a rectangular grid, and generating a first sub-frame and second sub-frame corresponding to the image data on a diamond grid" because the Appellant believes that Gibbons teaches only rectangular grids for all images.

The Appellant secondly argues that Messing does not teach or suggest "receiving image data for an image on a rectangular grid, and generating a first sub-frame and second sub-frame corresponding to the image data on a diamond grid" because the Appellant believes that Messing's sampling of a single color field on a quincunx grid which produces a single green color quincunx field doesn't teach the generation of first and second sub-frames on a diamond grid.

The Appellant thirdly argues that Messing's green color field itself is not even a displayable image.

2. The Examiner's response to the Appellants' first argument is that Gibbon does not teach such a limitation because as discussed above Gibbon teaches only rectangular grids for all of the images. Since Gibbon teaches all the other limitations of the claim, Messing was the secondary reference which was used to obviously teach this rectangular first type grid and this diamond second type grid [diamond is another way of describing an irregular grid or quincunx grid] as discussed above in Section I-A.2.

The Examiner's response to the Appellants' second argument is that Messing is not used to teach the production of the low resolution images but rather ***only*** showing this limitation wherein the first type of grid is a rectangular grid and the second type of grid is a diamond grid. Gibbon as discussed above teaches receiving a high resolution image, generating two sub-frames on a different grid, and alternating between displaying the two offset sub-frames.

The Examiner's response to the Appellants third argument is that each of Messings' color fields are low resolution images and each color field definitely would be displayable as is well known in the art except with a display of much less information than a full resolution image since it is only one out of three color fields of the image.

For these reasons, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 2.

C. Rejection of Claim 3 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing.

1. *The Appellant argues,* regarding claim 3 (see Appeal Brief, pp. 11-12) that the Examiner has not cited any disclosure in Gibbon or Messing that teaches or suggests first and second sub-frames that include diamond-shaped pixels on a diamond grid.

2. The Examiner's response to the Appellants argument is that Gibbon discloses the two sub-frames which are on rectangular grids and Messing's teachings obviously show that Gibbons two sub-frames are on a diamond grid as

discussed above in Section I-A.2. Therefore the pixels are basically diamond shaped due to the fact that the pixels are on a diamond shaped grid.

For these reasons, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 3.

D. Rejection of Claim 4 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing.

1. *The Appellant firstly argues,* regarding claim 4 (see Appeal Brief, pp. 12) that Gibbon does not teach or suggest "receiving image data for an image on a diamond grid, and generating a first sub-frame and second sub-frame corresponding to the image data on a rectangular grid" because the Appellant believes that Gibbons teaches only rectangular grids for all images.

The Appellant secondly argues that Messing does not teach or suggest "receiving image data for an image on a diamond grid, and generating a first sub-frame and second sub-frame corresponding to the image data on a rectangular grid" because the Appellant believes that Messing's teaching of a green color field 78 on a quincunx grid being transformed by the CCDDSP into a green rectangular grid 106 doesn't suggest receiving image data for an image on a diamond grid, and generating first and second sub-frames corresponding to the image data on a rectangular grid (the Appellant specifically states that a single green color field is not a generation of first and second sub-frames).

2. The Examiner's response to the Appellants' first argument is that Gibbon does not teach such a limitation because as discussed above Gibbon teaches only rectangular grids for all of the images. Since Gibbon teaches all the other limitations of the claim, Messing was the secondary reference which was used to obviously teach this diamond first type grid [diamond is another way of describing an irregular grid or quincunx grid] and this rectangular second type grid as discussed above in Section I-A.2 (see Messing, Fig. 7, ref. No. 106, col. 6, lines 23-35, Messing is ***only*** showing that a diamond grid 78 could be manipulated into rectangular grid 106 [see Fig. 7] whereas in Sections I-A.2 and I-B.2 Messing is ***only*** showing that a rectangular grid 72 could be manipulated into a diamond grid 78 [see Fig. 6]).

The Examiner's response to the Appellants' second argument is that Messing is not teaching the production of the low resolution images but rather ***only*** showing this limitation wherein the first type of grid is a diamond grid and the second type of grid is a rectangular grid. Gibbon as discussed above teaches receiving a high resolution image, generating two sub-frames on a different grid, and alternating between displaying the two offset sub-frames.

For these reasons, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 4.

E. Rejecti on of Claim 5 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing.

1. *The Appellant argues,* regarding claim 5 (see Appeal Brief, pp. 12-13) that the Examiner has not cited any disclosure in Gibbon or Messing that teaches or suggest image data with diamond-shaped pixels on a diamond grid and generating first and second sub-frames with rectangular shaped pixels on a rectangular grid.

2. The Examiner's response to the Appellants argument is that Gibbon discloses the two sub-frames which are on rectangular grids and Messing's teachings obviously show that Gibbons image data are on a diamond grid as discussed above in Section I-D.2. Therefore the pixels in the image data are basically diamond shaped due to the fact that the pixels in the image data are on a diamond shaped grid, and the pixels in the sub-frames are basically diamond shaped due to the fact that the pixels in the sub-frames are on a rectangular shaped grid.

For these reasons, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 5.

F. Rejection of Claim 10 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing.

1. *The Appellant argues* for the patentability of claim 10 (see Appeal Brief, pp. 13-15) based on the same reasoning used for the arguments pertaining to claim 1 respectively as discussed above in Section I-A.1.

2. For the same reasons respectively as discussed above in Section I-A.2 with respect to claim 1, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 10.

G. Rejection of Claim 11 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing.

1. *The Appellant argues* for the patentability of claim 11 (see Appeal Brief, pp. 15-17) based on the same reasoning used for the arguments pertaining to claim 2 respectively as discussed above in Section I-B.1.

2. For the same reasons respectively as discussed above in Section I-B.2 with respect to claim 2, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 11.

H. Rejection of Claim 12 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing.

1. *The Appellant argues* for the patentability of claim 12 (see Appeal Brief, pp. 17) based on the same reasoning used for the arguments pertaining to claim 3 respectively as discussed above in Section I-C.1.

2. For the same reasons respectively as discussed above in Section I-C.2 with respect to claim 3, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 12.

I. Rejection of Claim 13 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing.

1. *The Appellant argues* for the patentability of claim 13 (see Appeal Brief, pp. 17-18) based on the same reasoning used for the arguments pertaining to claim 4 respectively as discussed above in Section I-D.1.

2. For the same reasons respectively as discussed above in Section I-D.2 with respect to claim 4, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 13.

J. Rejection of Claim 14 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing.

1. *The Appellant argues* for the patentability of claim 14 (see Appeal Brief, pp. 18) based on the same reasoning used for the arguments pertaining to claim 5 respectively as discussed above in Section I-E.1.

2. For the same reasons respectively as discussed above in Section I-E.2 with respect to claim 5, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 14.

II. Rejection of Claims 6, 7, 15, 16, 19-24, 27-34, and 37-40 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing, and further in view of Park.

A. Rejection of Claims 6, 7, 15, and 16 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing, and further in view of Park.

1. *The Appellant argues* for the patentability of claims 6, 7, 15, and 16 (see Appeal Brief, pp. 19) because the Appellant believes that independent claims 1 and 10 are allowable over the cited references making the dependent claims 6, 7, 15 and 16 which further limits the independent claims 1 and 10 respectively allowable over the cited references as well.

2. The Examiner's response to the Appellants' arguments is that independent claims 1 and 10 are not allowable over the cited references as discussed above in Sections I-A.2 and I-F.2 and therefore the Examiner considers these arguments unpersuasive and maintains the previous rejection of claims 6, 7, 15, and 16.

B. Rejection of Claims 19 and 24 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing, and further in view of Park.

1. *The Appellant firstly argues* for the patentability of claim 19 (see Appeal Brief, pp. 19-21) based on the same reasoning used for the arguments pertaining to claim 1 respectively as discussed above in Section I-A.1.

The Appellant secondly argues that Park does not teach or suggest the quoted limitations of "wherein one of the first type of grid and the second type of grid is a non-rectangular grid".

The Appellant thirdly argues for the patentability of claim 24 because the Appellant believes that independent claim 19 is allowable over the cited references

making the dependent claim 24 which further limits the independent claim 19 allowable over the cited references as well.

2. Firstly, for the same reasons respectively as discussed above in Section I-A.2 with respect to claim 1, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 19.

Secondly, Park teaches the relationship being based on minimization of an error between the high resolution image data and a simulated image data as discussed in the Art Rejection as discussed above in Section **(9) Grounds of Rejection**. Gibbon and Messing teach the quoted limitation of "wherein one of the first type of grid and the second type of grid is a non-rectangular grid" respectively as discussed above in Section I-A.2 with respect to claim 1. Therefore, the Examiner once again considers these arguments unpersuasive and maintains the previous rejection of claim 19.

Thirdly, independent claim 19 is not allowable over the cited references as discussed above and therefore the Examiner considers these arguments over claim 24 unpersuasive and maintains the previous rejection of claim 24.

C. Rejection of Claim 20 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing, and further in view of Park.

1. *The Appellant firstly argues* for the patentability of claim 20 (see Appeal Brief, pp. 21-23) based on the same reasoning used for the arguments pertaining to claim 2 respectively as discussed above in Section I-B.1.

The Appellant secondly argues that Park does not teach or suggest the quoted limitations of "wherein the first type of grid is a rectangular grid and the second type of grid is a diamond grid".

2. Firstly, for the same reasons respectively as discussed above in Section I-B.2 with respect to claim 2, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 20.

Secondly, Park teaches the relationship being based on minimization of an error between the high resolution image data and a simulated image data as discussed in the Art Rejection as discussed above in Section **(9) Grounds of Rejection**. Gibbon and Messing teach the quoted limitation of "wherein one the first type of grid is a rectangular grid and the second type of grid is a diamond grid" respectively as discussed above in Section I-B.2 with respect to claim 2. Therefore the Examiner once again considers these arguments unpersuasive and maintains the previous rejection of claim 20.

D. Rejection of Claim 21 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing, and further in view of Park.

1. *The Appellant firstly argues* for the patentability of claim 21 (see Appeal Brief, pp. 23-24) based on the same reasoning used for the arguments pertaining to claim 3 respectively as discussed above in Section I-C.1.

The Appellant secondly argues that Park does not teach or suggest the quoted limitations of "wherein the first high resolution image includes rectangular-shaped pixels on the rectangular grid, and the first plurality of low resolution sub-frames each include diamond-shaped pixels on the diamond grid".

2. Firstly, for the same reasons respectively as discussed above in Section I-C.2 with respect to claim 3, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 21.

Secondly, Park teaches the relationship being based on minimization of an error between the high resolution image data and a simulated image data as discussed in the Art Rejection as discussed above in Section **(9) Grounds of Rejection**. Gibbon and Messing teach the quoted limitation of "wherein the first high resolution image includes rectangular-shaped pixels on the rectangular grid, and the first plurality of low resolution sub-frames each include diamond-shaped pixels on the diamond grid" respectively as discussed above in Section I-C.2 with respect to claim 3. Therefore the Examiner once again considers these arguments unpersuasive and maintains the previous rejection of claim 21.

E. Rejecti on of Claim 22 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing, and further in view of Park.

1. *The Appellant firstly argues* for the patentability of claim 22 (see Appeal Brief, pp. 24) based on the same reasoning used for the arguments pertaining to claim 4 respectively as discussed above in Section I-D.1.

The Appellant secondly argues that Park does not teach or suggest the quoted limitations of "wherein the first type of grid is a diamond grid and the second type of grid is a rectangular grid".

2. Firstly, for the same reasons respectively as discussed above in Section I-D.2 with respect to claim 4, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 22.

Secondly, Park teaches the relationship being based on minimization of an error between the high resolution image data and a simulated image data as discussed in the Art Rejection as discussed above in Section **(9) Grounds of Rejection**. Gibbon and Messing teach the quoted limitation of "wherein the first type of grid is a diamond grid and the second type of grid is a rectangular grid" respectively as discussed above in Section I-D.2 with respect to claim 4. Therefore the Examiner once again considers these arguments unpersuasive and maintains the previous rejection of claim 22.

F. Rejection of Claim 23 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing, and further in view of Park.

1. *The Appellant firstly argues* for the patentability of claim 23 (see Appeal Brief, pp. 25) based on the same reasoning used for the arguments pertaining to claim 5 respectively as discussed above in Section I-E.1.

The Appellant secondly argues that Park does not teach or suggest the quoted limitations of "wherein the first high resolution image includes diamond-shaped pixels on the diamond grid, and the first plurality of low resolution sub-frames each include rectangular-shaped pixels on the rectangular grid".

2. Firstly, for the same reasons respectively as discussed above in Section I-E.2 with respect to claim 5, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 23.

Secondly, Park teaches the relationship being based on minimization of an error between the high resolution image data and a simulated image data as discussed in the Art Rejection as discussed above in Section **(9) Grounds of Rejection**. Gibbon and Messing teach the quoted limitation of "wherein the first high resolution image includes diamond-shaped pixels on the diamond grid, and the first plurality of low resolution sub-frames each include rectangular-shaped pixels on the rectangular grid" respectively as discussed above in Section I-E.2 with respect to claim 5. Therefore the Examiner once again considers these arguments unpersuasive and maintains the previous rejection of claim 23.

G. Rejection of Claims 27 and 30 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing, and further in view of Park.

1. *The Appellant firstly argues* for the patentability of claim 27 (see Appeal Brief, pp. 25-28) based on the same reasoning used for the arguments pertaining to claim 1 respectively as discussed above in Section I-A.1.

The Appellant secondly argues that Park does not teach or suggest the quoted limitations of "wherein one of the first type of grid and the second type of grid is a non-rectangular grid".

The Appellant thirdly argues for the patentability of claim 30 because the Appellant believes that independent claim 27 is allowable over the cited references making the dependent claim 30 which further limits the independent claim 27 allowable over the cited references as well.

2. Firstly, for the same reasons respectively as discussed above in Section I-A.2 with respect to claim 1, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 27.

Secondly, Park teaches the relationship being based on minimization of a difference between the high resolution image data and a simulated image data as discussed in the Art Rejection as discussed above in Section **(9) Grounds of Rejection**. Gibbon and Messing teach the quoted limitation of "wherein one of the first type of grid and the second type of grid is a non-rectangular grid" respectively as discussed above in Section I-A.2 with respect to claim 1. Therefore, the

Examiner once again considers these arguments unpersuasive and maintains the previous rejection of claim 27.

Thirdly, independent claim 27 is not allowable over the cited references as discussed above and therefore the Examiner considers these arguments over claim 30 unpersuasive and maintains the previous rejection of claim 30.

H. Rejection of Claim 28 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing, and further in view of Park.

1. *The Appellant firstly argues* for the patentability of claim 28 (see Appeal Brief, pp. 28-29) based on the same reasoning used for the arguments pertaining to claim 2 respectively as discussed above in Section I-B.1.

The Appellant secondly argues that Park does not teach or suggest the quoted limitations of "wherein one first type of grid is a rectangular grid and the second type of grid is a diamond grid".

2. Firstly, for the same reasons respectively as discussed above in Section I-B.2 with respect to claim 2, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 28.

Secondly, Park teaches the relationship being based on minimization of a difference between the high resolution image data and a simulated image data as discussed in the Art Rejection as discussed above in Section **(9) Grounds of Rejection**. Gibbon and Messing teach the quoted limitation of "wherein one the first type of grid is a rectangular grid and the second type of grid is a diamond grid" respectively as discussed above in Section I-B.2 with respect to claim 2. Therefore

the Examiner once again considers these arguments unpersuasive and maintains the previous rejection of claim 28.

I. Rejection of Claim 29 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing, and further in view of Park.

1. *The Appellant firstly argues* for the patentability of claim 29 (see Appeal Brief, pp. 29-30) based on the same reasoning used for the arguments pertaining to claim 4 respectively as discussed above in Section I-D.1.

The Appellant secondly argues that Park does not teach or suggest the quoted limitations of "wherein the first type of grid is a diamond grid and the second type of grid is a rectangular grid".

2. Firstly, for the same reasons respectively as discussed above in Section I-D.2 with respect to claim 4, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 29.

Secondly, Park teaches the relationship being based on minimization of a difference between the high resolution image data and a simulated image data as discussed in the Art Rejection as discussed above in Section **(9) Grounds of Rejection**. Gibbon and Messing teach the quoted limitation of "wherein the first type of grid is a diamond grid and the second type of grid is a rectangular grid" respectively as discussed above in Section I-D.2 with respect to claim 4. Therefore the Examiner once again considers these arguments unpersuasive and maintains the previous rejection of claim 29.

J. Rejection of Claims 31 and 34 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing, and further in view of Park.

1. *The Appellant firstly argues* for the patentability of claim 31 (see Appeal Brief, pp. 30-33) based on the same reasoning used for the arguments pertaining to claim 1 respectively as discussed above in Section I-A.1.

The Appellant secondly argues that Park does not teach or suggest the quoted limitations of "wherein one of the first type of grid and the second type of grid is a non-rectangular grid".

The Appellant thirdly argues for the patentability of claim 34 because the Appellant believes that independent claim 31 is allowable over the cited references making the dependent claim 34 which further limits the independent claim 31 allowable over the cited references as well.

2. Firstly, for the same reasons respectively as discussed above in Section I-A.2 with respect to claim 1, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 31.

Secondly, Park teaches the relationship being based on minimization of an error between the image data and a simulated image data as discussed in the Art Rejection as discussed above in Section **(9) Grounds of Rejection**. Gibbon and Messing teach the quoted limitation of "wherein one of the first type of grid and the second type of grid is a non-rectangular grid" respectively as discussed above in Section I-A.2 with respect to claim 1. Therefore, the Examiner once

again considers these arguments unpersuasive and maintains the previous rejection of claim 31.

Thirdly, independent claim 31 is not allowable over the cited references as discussed above and therefore the Examiner considers these arguments over claim 34 unpersuasive and maintains the previous rejection of claim 34.

K. Rejection of Claim 32 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing, and further in view of Park.

1. *The Appellant firstly argues* for the patentability of claim 32 (see Appeal Brief, pp. 33-34) based on the same reasoning used for the arguments pertaining to claim 2 respectively as discussed above in Section I-B.1.

The Appellant secondly argues that Park does not teach or suggest the quoted limitations of "wherein the first type of grid is a rectangular grid and the second type of grid is a diamond grid".

2. Firstly, for the same reasons respectively as discussed above in Section I-B.2 with respect to claim 2, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 32.

Secondly, Park teaches the relationship being based on minimization of an error between the image data and a simulated image data as discussed in the Art Rejection as discussed above in Section **(9) Grounds of Rejection**. Gibbon and Messing teach the quoted limitation of "wherein one the first type of grid is a rectangular grid and the second type of grid is a diamond grid" respectively as discussed above in Section I-B.2 with respect to claim 2. Therefore the Examiner

once again considers these arguments unpersuasive and maintains the previous rejection of claim 32.

L. Rejection of Claim 33 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing, and further in view of Park.

1. *The Appellant firstly argues* for the patentability of claim 33 (see Appeal Brief, pp. 34) based on the same reasoning used for the arguments pertaining to claim 3 respectively as discussed above in Section I-C.1.

The Appellant secondly argues that Park does not teach or suggest the quoted limitations of "wherein the image data includes rectangular-shaped pixels on the rectangular grid, and the first frame includes diamond-shaped pixels on the diamond grid".

2. Firstly, for the same reasons respectively as discussed above in Section I-C.2 with respect to claim 3, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 33.

Secondly, Park teaches the relationship being based on minimization of an error between the image data and a simulated image data as discussed in the Art Rejection as discussed above in Section **(9) Grounds of Rejection**. Gibbon and Messing teach the quoted limitation of "wherein the image data includes rectangular-shaped pixels on the rectangular grid, and the first frame includes diamond-shaped pixels on the diamond grid" respectively as discussed above in Section I-C.2 with respect to claim 3. Therefore the Examiner once again

considers these arguments unpersuasive and maintains the previous rejection of claim 33.

M. Rejection of Claims 37 and 40 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing, and further in view of Park.

1. *The Appellant firstly argues* for the patentability of claim 37 (see Appeal Brief, pp. 34-37) based on the same reasoning used for the arguments pertaining to claim 1 respectively as discussed above in Section I-A.1.

The Appellant secondly argues that Park does not teach or suggest the quoted limitations of "wherein one of the first type of grid and the second type of grid is a non-rectangular grid".

The Appellant thirdly argues for the patentability of claim 40 because the Appellant believes that independent claim 37 is allowable over the cited references making the dependent claim 40 which further limits the independent claim 37 allowable over the cited references as well.

2. Firstly, for the same reasons respectively as discussed above in Section I-A.2 with respect to claim 1, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 37.

Secondly, Park teaches the relationship being based on minimization of an error between the image data and a simulated image data as discussed in the Art Rejection as discussed above in Section **(9) Grounds of Rejection**. Gibbon and Messing teach the quoted limitation of "wherein one of the first type of grid and the second type of grid is a non-rectangular grid" respectively as discussed

above in Section I-A.2 with respect to claim 1. Therefore, the Examiner once again considers these arguments unpersuasive and maintains the previous rejection of claim 37.

Thirdly, independent claim 37 is not allowable over the cited references as discussed above and therefore the Examiner considers these arguments over claim 40 unpersuasive and maintains the previous rejection of claim 40.

N. Rejection of Claim 38 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing, and further in view of Park.

1. *The Appellant firstly argues* for the patentability of claim 38 (see Appeal Brief, pp. 37-38) based on the same reasoning used for the arguments pertaining to claim 2 respectively as discussed above in Section I-B.1.

The Appellant secondly argues that Park does not teach or suggest the quoted limitations of "wherein the first type of grid is a rectangular grid and the second type of grid is a diamond grid".

2. Firstly, for the same reasons respectively as discussed above in Section I-B.2 with respect to claim 2, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 38.

Secondly, Park teaches the relationship being based on minimization of an error between the image data and a simulated image data as discussed in the Art Rejection as discussed above in Section **(9) Grounds of Rejection**. Gibbon and Messing teach the quoted limitation of "wherein one the first type of grid is a rectangular grid and the second type of grid is a diamond grid" respectively as

discussed above in Section I-B.2 with respect to claim 2. Therefore the Examiner once again considers these arguments unpersuasive and maintains the previous rejection of claim 38.

O. Rejection of Claim 39 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing, and further in view of Park.

1. *The Appellant firstly argues* for the patentability of claim 39 (see Appeal Brief, pp. 38) based on the same reasoning used for the arguments pertaining to claim 3 respectively as discussed above in Section I-C.1.

The Appellant secondly argues that Park does not teach or suggest the quoted limitations of "wherein the image data includes rectangular-shaped pixels on the rectangular grid, and the first frame includes diamond-shaped pixels on the diamond grid".

2. Firstly, for the same reasons respectively as discussed above in Section I-C.2 with respect to claim 3, the Examiner considers these arguments unpersuasive and maintains the previous rejection of claim 39.

Secondly, Park teaches the relationship being based on minimization of an error between the image data and a simulated image data as discussed in the Art Rejection as discussed above in Section **(9) Grounds of Rejection**. Gibbon and Messing teach the quoted limitation of "wherein the image data includes rectangular-shaped pixels on the rectangular grid, and the first frame includes diamond-shaped pixels on the diamond grid" respectively as discussed above in Section I-C.2 with respect to claim 3. Therefore the Examiner once again

considers these arguments unpersuasive and maintains the previous rejection of claim 39.

III. Rejection of Claims 8, 9, 17, 18, 25, 26, 35, 36, 41, and 42 under 35 U.S.C. 103(a) as being unpatentable over Gibbon in view of Messing, Park, Nomura and Tanaka.

1. *The Appellant argues* for the patentability of claims 8, 9, 17, 18, 25, 26, 35, 36, 41, and 42 (see Appeal Brief, pp. 39) because the Appellant believes that independent claims 1, 10, 19, 31, and 37 are allowable over the cited references making the dependent claims 8, 9, 17, 18, 25, 26, 35, 36, 41, and 42 which further limit the independent claims 1, 10, 19, 31, and 37 respectively allowable over the cited references as well.

2. The Examiner's response to the Appellants' arguments is that independent claims 1, 10, 19, 31, and 37 are not allowable over the cited references as discussed above and therefore the Examiner considers these arguments unpersuasive and maintains the previous rejection of claims 8, 9, 17, 18, 25, 26, 35, 36, 41, and 42.

For all the above reasons, the Examiner maintains the previous rejection of claims 1-42 because claims 1-42 are not allowable over the cited prior art.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

Bernard Krasnic (Examiner) Bernard Krasnic 10/25/2007

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